

Electricity and Magnetism, Australia, NMIA (National Metrology Institute, Australia)

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one ?	Uncertainty matrix	Comments	NMI service identifier
DC voltage sources: single values	Zener references	Voltage difference	1	1	V	Temperature	20 °C	0.1	μV/V	2	95%	Yes		Approved on 18 October 2004	1
DC voltage sources: single values	Zener references	Voltage difference	1.018	1.018	V	Temperature	20 °C	0.1	μV/V	2	95%	Yes		Approved on 18 October 2004	2
DC voltage sources: single values	Zener references	Voltage difference	10	10	V	Temperature	20 °C	0.1	μV/V	2	95%	Yes		Approved on 18 October 2004	3
DC resistance standards and sources: low values (<= 1 Ω)	Standard resistor	Resistance bridge	0.001	< 0.01	Ω	Air or oil bath temperature	20 °C to 25 °C	2	μΩ/Ω	2	95%	Yes		Approved on 18 October 2004	4
DC resistance standards and sources: low values (<= 1 Ω)	Standard resistor	Resistance bridge	0.01	< 1	Ω	Air or oil bath temperature	20 °C to 25 °C	1	μΩ/Ω	2	95%	Yes		Approved on 18 October 2004	5
DC resistance standards and sources: low values (<= 1 Ω)	Standard resistor	Resistance bridge	1	1	Ω	Air or oil bath temperature	20 °C to 25 °C	0.08	μΩ/Ω	2	95%	Yes		Approved on 18 October 2004	6
DC resistance standards and sources: intermediate values (> 1 Ω to 1 MΩ)	Standard resistor	Resistance bridge	> 1	< 10	Ω	Air or oil bath temperature	20 °C to 25 °C	0.3	μΩ/Ω	2	95%	Yes		Approved on 18 October 2004	7
DC resistance standards and sources: intermediate values (> 1 Ω to 1 MΩ)	Standard resistor	Resistance bridge	10	10	Ω	Air or oil bath temperature	20 °C to 25 °C	0.15	μΩ/Ω	2	95%	Yes		Approved on 18 October 2004	8
DC resistance standards and sources: intermediate values (> 1 Ω to 1 MΩ)	Standard resistor	Resistance bridge	> 10	< 100	Ω	Air or oil bath temperature	20 °C to 25 °C	0.3	μΩ/Ω	2	95%	Yes		Approved on 18 October 2004	9

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DC resistance standards and sources: intermediate values (> 1 Ω to 1 M Ω)	Standard resistor	Resistance bridge	100	100	Ω	Air or oil bath temperature	20 °C to 25 °C	0.15	$\mu\Omega/\Omega$	2	95%	Yes		Approved on 18 October 2004	10
DC resistance standards and sources: intermediate values (> 1 Ω to 1 M Ω)	Standard resistor	Resistance bridge	> 0.1	< 1	k Ω	Air or oil bath temperature	20 °C to 25 °C	0.3	$\mu\Omega/\Omega$	2	95%	Yes		Approved on 18 October 2004	11
DC resistance standards and sources: intermediate values (> 1 Ω to 1 M Ω)	Standard resistor	Resistance bridge	1	1	k Ω	Air or oil bath temperature	20 °C to 25 °C	0.15	$\mu\Omega/\Omega$	2	95%	Yes		Approved on 18 October 2004	12
DC resistance standards and sources: intermediate values (> 1 Ω to 1 M Ω)	Standard resistor	Resistance bridge	> 1	< 10	k Ω	Air or oil bath temperature	20 °C to 25 °C	0.3	$\mu\Omega/\Omega$	2	95%	Yes		Approved on 18 October 2004	13
DC resistance standards and sources: intermediate values (> 1 Ω to 1 M Ω)	Standard resistor	Resistance bridge	10	10	k Ω	Air or oil bath temperature	20 °C to 25 °C	0.08	$\mu\Omega/\Omega$	2	95%	Yes		Approved on 18 October 2004	14
DC resistance standards and sources: intermediate values (> 1 Ω to 1 M Ω)	Standard resistor	Resistance bridge	> 0.01	1	M Ω	Air or oil bath temperature	20 °C to 25 °C	1	$\mu\Omega/\Omega$	2	95%	Yes		Approved on 18 October 2004	15
DC resistance standards and sources: high values (> 1 M Ω)	Standard resistor	Resistance bridge	> 1	10	M Ω	Air or oil bath temperature	20 °C to 25 °C	10	$\mu\Omega/\Omega$	2	95%	Yes		Approved on 18 October 2004	16

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DC resistance standards and sources: high values (> 1 MΩ)	Standard resistor	Resistance bridge	> 10	100	MΩ	Air or oil bath temperature	20 °C to 25 °C	20	μΩ/Ω	2	95%	Yes		Approved on 18 October 2004	17
DC resistance standards and sources: high values (> 1 MΩ)	Standard resistor	Resistance bridge	> 10	100	MΩ	Laboratory temperature	20 °C to 25 °C	300	μΩ/Ω	2	95%	Yes		Approved on 18 October 2004	18
						Voltage	100 V to 1000 V							Approved on 18 October 2004	
DC resistance standards and sources: high values (> 1 MΩ)	Standard resistor	Resistance bridge	> 0.1	1	GΩ	Temperature	20 °C to 25 °C	500	μΩ/Ω	2	95%	Yes		Approved on 18 October 2004	19
						Voltage	100 V to 1000 V								
						Humidity	30% to 70%								
DC resistance standards and sources: high values (> 1 MΩ)	Standard resistor	Resistance bridge	> 1	100	GΩ	Temperature	20 °C to 25 °C	1000	μΩ/Ω	2	95%	Yes		Approved on 18 October 2004	20
						Voltage	100 V to 1000 V								
						Humidity	30% to 70%								
DC resistance standards and sources: high values (> 1 MΩ)	Standard resistor	Resistance bridge	> 0.1	1	TΩ	Temperature	20 °C to 25 °C	2000	μΩ/Ω	2	95%	Yes		Approved on 18 October 2004	21
						Voltage	100 V to 1000 V								
						Humidity	30% to 70%								
DC resistance standards and sources: high values (> 1 MΩ)	Standard resistor	Resistance bridge	> 1	10	TΩ	Temperature	20 °C to 25 °C	2000	μΩ/Ω	2	95%	Yes		Approved on 18 October 2004	22
						Voltage	100 V to 1000V								
						Humidity	30% to 70%								
DC resistance standards and sources: high values (> 1 MΩ)	Standard resistor	Resistance bridge	> 10	100	TΩ	Temperature	20 °C to 25 °C	5000	μΩ/Ω	2	95%	Yes		Approved on 18 October 2004	23
						Voltage	100 V to 1000 V								
						Humidity	30% to 70%								

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DC resistance standards and sources: standards for high current	DC shunt	Resistance bridge	10	< 100	$\mu\Omega$	Current	100 A to 3000 A	200 to 20	$\mu\Omega/\Omega$	2	95%	Yes		Approved on 18 October 2004	24
DC resistance standards and sources: standards for high current	DC shunt	Resistance bridge	100	<1000	$\mu\Omega$	Current	100 A to 1000 A	20 to 10	$\mu\Omega/\Omega$	2	95%	Yes		Approved on 18 October 2004	25
Capacitance: capacitance for low loss capacitors	Fused-silica standard capacitor	Capacitance bridge	10	100	pF	Frequency	1 kHz, 1.592 kHz	0.08	$\mu\text{F}/\text{F}$	2	95%	Yes		Approved on 18 October 2004	26
Capacitance: capacitance for low loss capacitors	Standard capacitor, gas dielectric	Capacitance bridge	10	10000	pF	Frequency	1 kHz, 1.592 kHz	0.1	$\mu\text{F}/\text{F}$	2	95%	Yes		Approved on 18 October 2004	27
Capacitance: capacitance for low loss capacitors	Standard capacitor, gas dielectric	Capacitance bridge	1	1000	pF	Frequency	400 Hz to 5 kHz	2	$\mu\text{F}/\text{F}$	2	95%	Yes		Approved on 18 October 2004	28
Capacitance: capacitance for low loss capacitors	Standard capacitor	Capacitance bridge	1	10	nF	Frequency	400 Hz to 5 kHz	20	$\mu\text{F}/\text{F}$	2	95%	Yes		Approved on 18 October 2004	29
Capacitance: capacitance for low loss capacitors	Standard capacitor	Capacitance bridge	0.01	1	μF	Frequency	400 Hz to 5 kHz	200	$\mu\text{F}/\text{F}$	2	95%	Yes		Approved on 18 October 2004	30
Inductance: self inductance, low values (< 1 mH)	Inductance standards	Maxwell bridge	10	1000	μH	Frequency	1 kHz	100	$\mu\text{H}/\text{H}$	2	95%	Yes		Approved on 18 October 2004	31
						Laboratory temperature	20 °C \pm 0.5 °C								
Inductance: self inductance, intermediate values (>= 1 mH to 1 H)	Inductance standards	Maxwell bridge	0.001	1	H	Frequency	1 kHz	5	$\mu\text{H}/\text{H}$	2	95%	Yes		Approved on 18 October 2004	32
						Laboratory temperature	20 °C \pm 0.5 °C								

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Quantity	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one ?	Uncertainty matrix	Comments	NMI service identifier
Inductance: self inductance, high values (> 1 H)	Inductance standards	Maxwell bridge	1	10	H	Frequency	1 kHz	100	μH/H	2	95%	Yes		Approved on 18 October 2004	33
						Laboratory temperature	20 °C ± 0.5 °C								
AC voltage ratio: real component	Inductive voltage dividers	Comparison	0	1		Frequency	50 Hz to 5 kHz	2.0E-08		2	95%	No		Approved on 18 October 2004	34
						Laboratory temperature	20 °C ± 0.5 °C								
AC/DC voltage transfer: AC/DC transfer difference at low voltages	Micropotentiometer, AC/DC transfer standard	AC/DC comparison	2	300	mV	Frequency	10 Hz to 1 MHz	21 to 280	μV/V	2	95%	Yes	AU 5.1.1	Approved on 18 October 2004	35
AC/DC voltage transfer: AC/DC transfer difference at medium voltages	Thermal voltage converter	AC/DC comparison	1	4	V	Frequency	10 Hz to 1 MHz	3 to 48	μV/V	2	95%	Yes	AU 5.1.2	Approved on 18 October 2004	36
AC/DC voltage transfer: AC/DC transfer difference at higher voltages	Thermal voltage converter	AC/DC comparison	6	1000	V	Frequency	10 Hz to 1 MHz	6 to 59	μV/V	2	95%	Yes	AU 5.1.3	Approved on 18 October 2004	37
AC/DC current transfer: AC/DC transfer difference	Thermal current converter	AC/DC comparison	0.005	20	A	Frequency	10 Hz to 100 kHz	12 to 79	μA/A	2	95%	Yes	AU 6.1.1	Approved on 18 October 2004	38
DC voltage meters: intermediate values	Digital multimeter	JAVS	0.001	10	V			50 to 0.2	μV/V	2	95%	Yes		Approved on 18 October 2004	39
DC voltage meters: intermediate values	Digital multimeter	Calibrators	0.001	10	V			3 to 500	μV/V	2	95%	Yes	AU 1.2.2	Approved on 18 October 2004	40
DC voltage meters: intermediate values	Digital multimeter	Calibrators	10	1100	V			2 to 5	μV/V	2	95%	Yes		Approved on 18 October 2004	41
AC voltage up to 1000 V: meters	AC measurement standard	Thermal transfer standards	0.002	1000	V	Frequency	10 Hz to 1 MHz	8 to 890	μV/V	2	95%	Yes	AU 5.2.2A	Approved on 18 October 2004	42
AC voltage up to 1000 V: meters	Digital multimeter	Thermal transfer standards	0.003	1000	V	Frequency	10 Hz to 1 MHz	40 to 5000	μV/V	2	95%	Yes	AU 5.2.2B	Approved on 18 October 2004	43

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DC current meters, intermediate values	Digital multimeter	Calibrators	0.0001	1	A			17 to 27	$\mu\text{A}/\text{A}$	2	95%	Yes	AU 3.2.2	Approved on 18 October 2004	44
DC resistance meters, low values	Digital multimeter	Standard resistors	0.1	1	Ω			2	$\mu\Omega/\Omega$	2	95%	Yes		Approved on 18 October 2004	46
DC resistance meters, intermediate values	Digital multimeter	Standard resistors	1	10	Ω			2	$\mu\Omega/\Omega$	2	95%	Yes		Approved on 18 October 2004	47
DC resistance meters, intermediate values	Digital multimeter	Standard resistors	0.01	10	$\text{k}\Omega$			1	$\mu\Omega/\Omega$	2	95%	Yes		Approved on 18 October 2004	48
DC resistance meters, intermediate values	Digital multimeter	Standard resistors	10	100	$\text{k}\Omega$			2	$\mu\Omega/\Omega$	2	95%	Yes		Approved on 18 October 2004	49
DC resistance meters, intermediate values	Digital multimeter	Standard resistors	0.1	1	$\text{M}\Omega$			3	$\mu\Omega/\Omega$	2	95%	Yes		Approved on 18 October 2004	50
DC resistance meters, intermediate values	Digital multimeter	Standard resistors	1	10	$\text{M}\Omega$			10	$\mu\Omega/\Omega$	2	95%	Yes		Approved on 18 October 2004	51
DC resistance meters, intermediate values	Digital multimeter	Standard resistors	10	100	$\text{M}\Omega$			20	$\mu\Omega/\Omega$	2	95%	Yes		Approved on 18 October 2004	52
DC resistance meters, intermediate values	Digital multimeter	Standard resistors	0.1	1	$\text{G}\Omega$			100	$\mu\Omega/\Omega$	2	95%	Yes		Approved on 18 October 2004	53
AC voltage: AC/DC transfer difference at low voltages	Digital multimeter	AC/DC comparison	3	30	mV	Frequency	10 Hz to 1 MHz	150	$\mu\text{V}/\text{V}$	2	95%	Yes		Approved on 18 October 2004	54
AC voltage: AC/DC transfer difference at low voltages	Digital multimeter	AC/DC comparison	0.03	0.5	V	Frequency	10 Hz to 1 MHz	25	$\mu\text{V}/\text{V}$	2	95%	Yes		Approved on 18 October 2004	55

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AC voltage: AC/DC transfer difference at medium voltages	Digital multimeter	AC/DC comparison	0.5	1	V	Frequency	10 Hz to 1 MHz	25	µV/V	2	95%	Yes		Approved on 18 October 2004	56
AC power and energy: single phase	Power meter, energy meter, power converter	Double bridge thermal power comparator	6	4800	W	Frequency	47 Hz to 60 Hz	30	µW/VA	2	95%	Yes		Approved on 18 October 2004	57
						Power factor	1 to 0 L/C								
						Voltage	60 V to 480 V								
						Current	0.1 A to 10 A								
AC power and energy: single phase	Power meter, energy meter, power converter	Double bridge thermal power comparator	600	48000	W	Frequency	47 Hz to 60 Hz	50	µW/VA	2	95%	Yes		Approved on 18 October 2004	58
						Power factor	1 to 0 L/C								
						Voltage	60 V to 480 V								
						Current	> 10 A to 100 A								
AC power and energy: single phase	Power meter, energy meter, power converter	Double bridge thermal power comparator	30	3000	W	Frequency	47 Hz to 53 Hz	20	µW/VA	2	95%	Yes		Approved on 18 October 2004	59
						Power factor	0								
						Voltage	60 V to 600 V								
						Current	0.5 A to 5 A								
AC power and energy: single phase	Power meter, energy meter, power converter	Double bridge thermal power comparator	600	600	W	Frequency	47 Hz to 53 Hz	20	µW/W	2	95%	Yes		Approved on 18 October 2004	60
						Power factor	1 and 0.5 L/C								
						Voltage	120 V								
						Current	5 A								

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AC power and energy: single phase	Reactive power meter	Double bridge thermal power comparator	6	12000	VA	Frequency	47 Hz to 60 Hz	100	µVA/(VA)	2	95%	Yes		Approved on 18 October 2004	61
						Voltage	60 V to 240 V								
						Current	0.1 A to 50 A								
Magnetic fields below 50 kHz: DC magnetic flux density and applied magnetic field strength	Gaussmeter	NMR teslameter, Helmholtz coil	1E-07	2	T			2	%	2	95%	Yes		Approved on 18 October 2004	62
Magnetic fields below 50 kHz: AC magnetic flux density and applied magnetic field strength	ELFmeter	NMR teslameter, Helmholtz coil	0.1	500	µT	Frequency	50 Hz / 60 Hz	2	%	2	95%	Yes		Approved on 18 October 2004	63
Magnetic fields below 50 kHz: DC magnetic flux density and applied magnetic field strength	Reference magnet	NMR teslameter, Helmholtz coil	0	2	T			0.5	%	2	95%	Yes		Approved on 18 October 2004	64
Magnetic fields below 50 kHz: DC magnetic flux	Fluxmeter	NMR teslameter, Helmholtz coil	0.01	10	Wb			2	%	2	95%	Yes		Approved on 18 October 2004	65
Soft magnetic sheet and powder materials: peak permeability	Bars	NMR teslameter, Helmholtz coil	1.001	2		Minimum recommended size	300 mm x 100 mm	0.5	%	2	95%	Yes		Approved on 18 October 2004	66
RF power: absolute power on coaxials	Generators and power meters	Power meter	0.001	10	mW	Frequency	1 MHz to 1 GHz	0.3 to 0.5	%	2	95%	Yes		Approved on 18 October 2004	67
						Connectors	N, APC-7, 3.5 mm, 2.9 mm, 2.4 mm								
RF power: absolute power on coaxials	Generators and power meters	Power meter	0.001	10	mW	Frequency	1 GHz to 18 GHz	0.4 to 1.2	%	2	95%	Yes		Approved on 18 October 2004	68

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						Connectors	N, APC-7, 3.5 mm, 2.9 mm, 2.4 mm								
RF power: absolute power on coaxials	Generators and power meters	Power meter	0.001	10	mW	Frequency	18 GHz to 40 GHz	2	%	2	95%	Yes		Approved on 18 October 2004	69
						Connectors	3.5 mm, 2.9 mm, 2.4 mm								
RF power: absolute power on waveguides	Generators and power meters	Power meter	0.001	10	mW	Frequency	18 GHz to 40 GHz	1.2 to 1.4	%	2	95%	Yes		Approved on 18 October 2004	70
						Connectors	Waveguide, X, Ku, K, Ka								
Scalar RF reflection coefficient and attenuation: attenuation on coaxials	Attenuators	Standard attenuator	0	100	dB	Frequency	30 MHz to 40 GHz	0.002 + 0.001/10	dB	2	95%	No		Approved on 18 October 2004	71
Scattering parameters (vectors): reflection coefficient on coaxials	Passive components	Vector network analyser	0	1		Frequency	9 kHz to 40 GHz	0.0025		2	95%	No		Approved on 18 October 2004	72
RF voltage and current: RF voltage sources	Thermal converters	AC/DC difference	0.25	100	V	Frequency	1 MHz to 10 MHz	0.03	%	2	95%	Yes		Approved on 18 October 2004	73
RF voltage and current: RF voltage sources	Thermal converters	AC/DC difference	0.25	100	V	Frequency	10 MHz to 50 MHz	0.15	%	2	95%	Yes		Approved on 18 October 2004	74
RF voltage and current: RF voltage sources	Thermal converters	AC/DC difference	0.25	100	V	Frequency	50 MHz to 100 MHz	0.38	%	2	95%	Yes		Approved on 18 October 2004	75
RF voltage and current: RF voltage sources	Thermal converters	AC/DC difference	1	7	V	Frequency	100 MHz to 500 MHz	0.84	%	2	95%	Yes		Approved on 18 October 2004	76
						Impedance	50 Ω								
RF voltage and current: RF voltage sources	Thermal converters	AC/DC difference	1	7	V	Frequency	500 MHz to 1000 MHz	1.06	%	2	95%	Yes		Approved on 18 October 2004	77
						Impedance	50 Ω								

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Antenna properties: antenna factor	Magnetic field antennas	Standard field	-60	-15	dB [(mA/m)/m V]	Frequency	9 kHz to 30 MHz	0.8	dB	2	95%	No		Approved on 18 October 2004	78
Antenna properties: antenna factor	Electric field antennas	3-antenna	-5	35	dB/m	Frequency	30 MHz to 1 GHz	0.6 to 1	dB	2	95%	No		Approved on 18 October 2004	79
Antenna properties: antenna gain	Pyramidal horn	3-antenna	5	25	dBi	Frequency	2.45 GHz to 18 GHz	0.05	dB	2	95%	No		Approved on 18 October 2004	80
Electromagnetic fields above 50 kHz: power flux density	Radiation meters	Standard receiver	2	1000	W/m ²	Frequency	2.45 GHz	0.4	dB	2	95%	Yes		Approved on 18 October 2004	81
Phase angle: phase shift	Phase shifters		0	360	°	Frequency	30 MHz	0.15	°	2	95%	No		Approved on 18 October 2004	82
Electromagnetic field above 50 kHz: electric field strength	Electric field probes	Standard field	10	50	V/m	Frequency	20 MHz to 1 GHz	1	dB	2	95%	Yes		Approved on 18 October 2004	83
Signal and pulse characteristics: pulse amplitude	ESD generators	IEC 100-4-2 (1955)	1	40	A			3	%	2	95%	Yes		Approved on 18 October 2004	84
AC high voltage: ratio error	VT	Clothier-Medina	1	1000		Frequency	50 Hz	1.00E-06 to 1.00E-05		2	95%	Yes		Approved on 18 October 2004	85
						Voltage	100 kV maximum								
AC high voltage: ratio phase displacement	VT	Clothier-Medina	-50	50	crad	Frequency	50 Hz	1E-04	crad	2	95%	No		Approved on 18 October 2004	86
						Voltage	100 kV maximum								
High AC current: ratio error	CT	Arnold	0.01	4000		Frequency	50 Hz	1.00E-06 to 1.00E-05		2	95%	Yes		Approved on 18 October 2004	87
						Maximum primary current	20 kA								
High AC current: ratio phase displacement	CT	Arnold	-18.9	18.9	crad	Frequency	50 Hz	1E-04	crad	2	95%	No		Approved on 18 October 2004	88

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						Maximum primary current	20 kA								
High DC voltage: ratios	Resistive divider	Intercomparison	1000	100000		Maximum direct voltage	100 kV	2E-05		2	95%	Yes		Approved on 18 October 2004	89
High voltage impedance: capacitance	Capacitor	Current comparator bridge	5	10000	pF	Maximum voltage	550 kV	5	μF/F	2	95%	Yes		Approved on 18 October 2004	90
High voltage impedance: dissipation factor	Capacitor	Current comparator bridge	1E-06	± 0.11		Maximum voltage	550 kV	1E-05		2	95%	No		Approved on 18 October 2004	91
Pulsed high voltage and current: lightning impulse voltage parameters, voltage ratio	Resistive divider	Intercomparison	300	300000		Maximum voltage	330 kV	1	%	2	95%	Yes		Approved on 18 October 2004	92
Pulsed high voltage and current: lightning impulse time parameters, front time	Resistive divider	Intercomparison	0.5	5	μs	Maximum voltage	330 kV	2	%	2	95%	Yes		Approved on 18 October 2004	93
Pulsed high voltage and current: lightning impulse voltage parameters, voltage ratio	Resistive divider	Intercomparison	1000	100000		Maximum voltage	1 MV	2	%	2	95%	Yes		Approved on 18 October 2004	94
Pulsed high voltage and current: lightning impulse time parameters, front time	Resistive divider	Intercomparison	0.5	5	μs	Maximum voltage	1 MV	3	%	2	95%	Yes		Approved on 18 October 2004	95
Pulsed high voltage and current: lightning impulse time parameters, time to half value	Resistive divider	Intercomparison	40	60	μs	Maximum voltage	1 MV	2	%	2	95%	Yes		Approved on 18 October 2004	96

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Quantity	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one ?	Uncertainty matrix	Comments	NMI service identifier
Pulsed high voltage and current: switching impulse voltage parameters, voltage ratio	Damped capacitive divider	Intercomparison	500	50000		Maximum voltage	500 kV	1	%	2	95%	Yes		Approved on 18 October 2004	97
Pulsed high voltage and current: switching impulse time parameters, front time	Damped capacitive divider	Intercomparison	200	300	µs	Maximum voltage	500 kV	3	%	2	95%	Yes		Approved on 18 October 2004	98
Pulsed high voltage and current: switching impulse time parameters, time to half value	Damped capacitive divider	Intercomparison	2000	3000	µs	Maximum voltage	500 kV	2	%	2	95%	Yes		Approved on 18 October 2004	99

Electricity and Magnetism, Australia, NMIA (National Metrology Institute, Australia)

Uncertainty matrix: AU 5.1.1

AC/DC voltage transfer: AC/DC transfer difference at low voltages. Internal identifier: 35

	10 Hz	20 Hz	30 Hz	40 Hz	57 Hz	100 Hz	400 Hz	1 kHz	5 kHz	10 kHz	20 kHz	30 kHz	50 kHz	100 kHz	200 kHz	300 kHz	500 kHz	800 kHz	1 MHz
2 mV	250	210	180	170	170	170	170	170	170	170	170	170	170	180	180	210	230	-	280
10 mV	130	87	68	60	59	59	59	59	59	60	61	62	63	72	79	98	140	-	190
20 mV	110	65	55	45	45	45	45	45	45	48	48	48	50	62	69	83	110	-	160
100 mV	85	45	34	29	29	28	29	29	29	33	33	33	36	40	49	62	87	-	160
200 mV	75	37	29	25	25	24	25	25	25	29	30	31	31	40	46	58	74	-	130
300 mV	57	31	23	22	22	21	21	21	21	26	28	28	29	37	44	56	73	-	140

The expanded uncertainties given in this table are expressed in $\mu\text{V/V}$.

Electricity and Magnetism, Australia, NMIA (National Metrology Institute, Australia)

Uncertainty matrix: AU 5.1.2

AC/DC voltage transfer: AC/DC transfer difference at medium voltages. Internal identifier: 36

	10 Hz	20 Hz	30 Hz	40 Hz	57 Hz	100 Hz	400 Hz	1 kHz	5 kHz	10 kHz	20 kHz	30 kHz	50 kHz	100 kHz	200 kHz	300 kHz	500 kHz	800 kHz	1 MHz
1 V	8	6	5	5	5	5	5	5	5	5	5	6	8	11	15	21	30	40	48
2 V	11	7	-	3	3	3	3	3	3	3	4	4	6	9	11	16	25	33	41
3 V	7	5	3	3	3	3	3	3	3	3	4	4	6	9	12	17	26	34	42
4 V	8	5	3	3	3	3	3	3	3	3	4	5	6	9	12	17	26	35	42

The expanded uncertainties given in this table are expressed in $\mu\text{V/V}$.

Electricity and Magnetism, Australia, NMIA (National Metrology Institute, Australia)

Uncertainty matrix: AU 5.1.3

AC/DC voltage transfer: AC/DC transfer difference at higher voltages. Internal identifier: 37

	10 Hz	20 Hz	30 Hz	40 Hz	57 Hz	100 Hz	400 Hz	1 kHz	5 kHz	10 kHz	20 kHz	30 kHz	50 kHz	100 kHz	200 kHz	300 kHz	500 kHz	800 kHz	1 MHz
6 V	10	7	6	6	6	-	6	6	-	6	6	7	9	13	18	24	35	46	56
10 V	9	7	6	6	6	6	6	6	6	6	6	7	9	13	18	24	35	46	56
12 V	9	7	6	6	6	6	6	6	6	6	6	8	9	13	18	25	37	48	59
20 V	11	8	7	7	7	-	7	7	-	7	7	8	10	14	21	28	40	-	-
30 V	10	8	7	7	7	7	7	7	7	7	8	10	14	18	25	32	43	-	-
40 V	11	8	8	8	8	8	7	7	8	8	9	11	14	19	26	-	-	-	-
60 V	11	9	8	8	8	-	8	8	-	8	9	11	15	20	-	-	-	-	-
100 V	11	9	8	8	8	8	8	8	8	8	9	11	15	20	-	-	-	-	-
120 V	11	9	9	9	9	9	9	9	9	9	10	12	16	21	-	-	-	-	-
200 V	13	10	10	9	9	-	9	9	-	10	10	12	16	23	-	-	-	-	-
300 V	13	11	10	10	10	10	10	10	10	10	11	13	17	24	-	-	-	-	-
400 V	14	12	11	11	11	11	11	11	11	11	12	15	19	28	-	-	-	-	-
600 V	15	13	13	13	13	-	13	13	-	14	16	19	26	37	-	-	-	-	-
1000 V	16	15	15	14	14	14	14	15	16	17	20	24	35	50	-	-	-	-	-

The expanded uncertainties given in this table are expressed in $\mu\text{V}/\text{V}$.

Electricity and Magnetism, Australia, NMIA (National Metrology Institute, Australia)

Uncertainty matrix: AU 6.1.1

AC/DC current transfer: AC/DC transfer difference. Internal identifier: 38

	10 Hz	20 Hz	30 Hz	40 Hz	57 Hz	400 Hz	1 kHz	2 kHz	5 kHz	10 kHz	20 kHz	50 kHz	100 kHz
5 mA	52	22	17	13	13	13	13	13	14	16	20	35	55
10 mA	52	22	17	13	13	13	13	13	14	15	19	33	49
20 mA	52	22	17	12	12	12	12	12	13	15	22	31	43
30 mA	52	22	17	16	12	12	16	17	17	19	22	31	46
50 mA	52	22	17	16	16	16	16	17	17	19	25	35	49
100 mA	57	31	26	21	21	21	21	21	22	23	29	38	52
200 mA	62	36	31	26	26	26	26	26	27	28	29	42	55
300 mA	62	36	31	26	26	26	26	26	27	28	34	51	-
500 mA	62	41	36	31	31	31	31	31	31	32	38	65	-
1 A	62	41	36	31	31	31	31	32	42	62	-	-	-
2 A	62	41	36	31	31	31	31	32	42	62	-	-	-
3 A	62	41	36	31	31	31	31	32	47	67	-	-	-
5 A	62	41	36	31	31	31	31	32	47	72	-	-	-
10 A	62	41	36	31	31	31	31	32	47	74	-	-	-
20 A	62	41	36	31	31	31	31	32	47	79	-	-	-

The expanded uncertainties given in this table are expressed in $\mu\text{A/A}$.

Electricity and Magnetism, Australia, NMIA (National Metrology Institute, Australia)

Uncertainty matrix: AU 1.2.2

DC voltage meters: intermediate values. Internal identifier: 40

	DC
1 mV	500
10 mV	50
100 mV	8
1 V	4
10 V	3

The expanded uncertainties given in this table are expressed in $\mu\text{V}/\text{V}$.

Electricity and Magnetism, Australia, NMIA (National Metrology Institute, Australia)

Uncertainty matrix: AU 5.2.2A

AC voltage up to 1000 V: meters. Internal identifier: 42

	10 Hz	20 Hz	30 Hz	40 Hz	57 Hz	100 Hz	400 Hz	1 kHz	5 kHz	10 kHz	20 kHz	30 kHz	50 kHz	100 kHz	200 kHz	300 kHz	500 kHz	800 kHz	1 MHz
2 mV	790	730	720	710	710	710	710	710	710	710	710	710	710	710	720	720	860	880	890
3 mV	670	590	570	570	570	570	570	570	570	570	570	570	570	570	570	580	750	770	770
10 mV	510	410	380	380	380	380	380	380	380	380	380	380	380	380	380	390	610	630	650
30 mV	360	350	350	350	350	350	350	350	350	350	350	350	350	350	350	350	360	360	390
100 mV	210	190	190	180	180	85	85	85	87	87	87	87	170	170	170	180	190	260	260
300 mV	65	40	25	24	24	23	23	23	27	27	29	30	31	39	47	61	84	180	180
1 V	31	25	9	9	9	9	9	9	9	9	9	11	12	15	18	28	47	110	120
3 V	31	25	8	8	8	8	8	8	8	8	8	10	11	13	16	25	45	110	120
10 V	31	25	9	9	9	9	9	9	9	9	9	11	12	15	19	29	49	110	130
30 V	31	25	9	9	9	9	9	9	9	9	9	10	11	14	17	26	53	-	-
100 V	32	26	11	11	11	11	11	11	11	11	11	12	14	19	-	-	-	-	-
300 V	36	30	20	19	19	19	19	19	19	19	20	22	26	32	-	-	-	-	-
1000 V	36	31	21	21	21	21	21	21	22	23	24	29	38	48	-	-	-	-	-

The expanded uncertainties given in this table are expressed in $\mu\text{V/V}$.

Electricity and Magnetism, Australia, NMIA (National Metrology Institute, Australia)

Uncertainty matrix: AU 5.2.2B

AC voltage up to 1000 V: meters. Internal identifier: 43

	10 Hz	20 Hz	30 Hz	40 Hz	57 Hz	100 Hz	400 Hz	1 kHz	5 kHz	10 kHz	20 kHz	30 kHz	50 kHz	100 kHz	200 kHz	300 kHz	500 kHz	1 MHz
3 mV	790	690	670	670	670	620	620	620	620	620	620	620	720	750	850	1700	2400	5000
10 mV	670	560	540	530	530	460	460	460	460	460	470	480	600	640	750	1600	2400	5000
30 mV	440	430	420	420	420	380	380	380	380	380	380	390	470	500	620	1100	1200	2500
100 mV	130	100	80	80	80	80	80	80	80	80	90	100	190	270	450	480	670	1500
0.3 V	100	70	50	50	50	50	50	50	50	50	60	80	110	210	420	450	650	1400
1 V	80	60	40	40	40	40	40	40	40	50	60	70	110	210	410	450	650	1400
3 V	80	60	40	40	40	40	40	40	40	50	60	70	110	210	410	450	650	1400
10 V	80	60	40	40	40	40	40	40	40	50	60	70	110	210	410	450	650	1400
30 V	80	60	40	40	40	40	40	40	40	50	60	70	110	210	410	450	640	-
100 V	80	60	60	60	40	40	40	40	40	50	60	80	110	210	410	450	-	-
1000 V	100	80	70	70	70	70	70	70	70	70	80	130	160	290	-	-	-	-

The expanded uncertainties given in this table are expressed in $\mu\text{V/V}$.

Electricity and Magnetism, Australia, NMIA (National Metrology Institute, Australia)

Uncertainty matrix: AU 3.2.2

DC current meters: intermediate values. Internal identifier: 44

	DC
100 μ A	20
1 mA	17
10 mA	17
100 mA	19
1 A	27

The expanded uncertainties given in this table are expressed in μ A/A.